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Strawberry Root-Weevil Control in Oregon

By

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John Ramage of Woodburn, applying strawberry weevil bait with a "bait gun" he devised.

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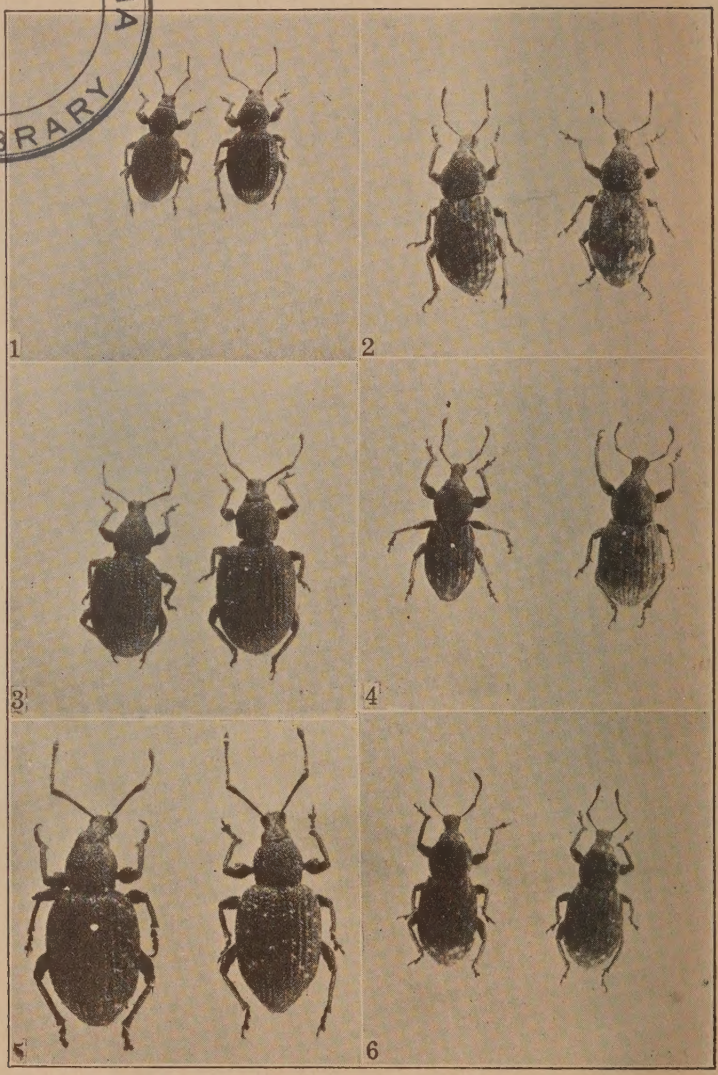

FIGURE 1. Six different kinds of root-weevils causing serious damage to strawberry plants in Oregon.

1. Strawberry root weevil, *Brachyrhinus ovatus* L.
2. Decorated strawberry root-weevil, *Dyslobus decoratus* Lec.
3. Rough strawberry root-weevil, *Brachyrhinus rugosostriatus* Goeze.
4. Lacomb strawberry root-weevil, *Dyslobus wilcoxi* Van Dyke.
5. Black vine weevil, *Brachyrhinus sulcatus* Fabr.
6. Western strawberry root-weevil, *Dyslobus ursinus* Horn.

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A STUDY of the root-weevils attacking strawberries in Oregon was undertaken in the spring of 1926 and continued through the 1931 season. The results of this investigation have been published in Station Bulletin 330, a complete technical report of the six-year study. The present circular contains only information that will be helpful to the grower in combating the root-weevils.

Two groups of root-weevils have been found causing serious damage to strawberry plants in Oregon. These groups are the *Brachyrhinus*, which are supposed to be introduced pests; and the *Dyslobus*, which are native but have changed their food habits from native vegetation to strawberry.

The *Brachyrhinus* group contains the strawberry root-weevil[1], the black vine weevil[2], and the rough strawberry root-weevil[3] (Figure 1), and in this circular will be called the common strawberry root-weevils.

The *Dyslobus* group contains at least three different weevils causing serious injury to strawberry plantings: the decorated strawberry root-weevil[4], the western strawberry root-weevil[5], and the Lacomb strawberry root-weevil[6] (Figure 1). Discussion in this circular will refer to these pests as the native strawberry root-weevils.

ACTIVITY OF STRAWBERRY ROOT-WEEVILS

These six species all injure strawberries in a similar manner. The adult weevils feed on the leaves of the plants, eating in from the margin and creating a characteristic "ragging" (1, Figure 2). The larvae or grubs feed on the roots and crowns of the plants. Usually only the small fibrous roots are eaten. They either are cut off, barked (girdled), or split in a characteristic manner. It is not uncommon to find the larvae boring in the crown or feeding around it so as to girdle it (2, Figure 2).

Strawberry weevil has many hosts. The strawberry root-weevil also has been found or reported feeding on wild strawberry, raspberry, blackberry, loganberry, gooseberry, conifer seedlings, cyclamen, privet, camelia, snowberry, primrose, saxifrages, gloxinia, rhododendron, cotoneaster, and other shrubs; on clover, alfalfa, and grass sod; and on various grass roots.

The species of the common strawberry root-weevils (*Brachyrhinus* group) differ from those of the native strawberry root-weevils (*Dyslobus* group) in their life histories and in the color of the adult weevils. The common weevils are rather shiny brown or black, more frequently black in color without scales on the body.

The native strawberry root-weevils usually appear to be grayish-brown, but on closer examination can be seen to be covered with minute scales that give off metallic copper or brass reflections.

[1] *Brachryhinus ovatus* L.
[2] *Brachyrhinus sulcatus* Fabr.
[3] *Brachyrhinus rugosostriatus* Goeze.
[4] *Dyslobus decoratus* Lec.
[5] *Dyslobus ursinus* Horn.
[6] *Dyslobus wilcoxi* Van Dyke.

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The strawberry root-weevil and its close relatives, *Brachyrhinus* sp., pass the winter principally in the grub stage, although in some parts of Oregon at higher elevations than the Willamette valley, the adults also overwinter. These overwintering grubs pupate (form cocoon-like cells) in the ground and change to the adult-weevil stage during the berry harvest (Figures 5 and 8).

The decorated strawberry root-weevil and its close relative, *Dyslobus* sp., differ in their life history from the common strawberry root-weevils in their habit of overwintering in the adult stage in the ground. The adults come

FIGURE 2. Adult weevils "rag" the leaves. Grubs feed on roots and crown.
1. Feeding of *D. decoratus* on strawberry leaves.
2. Injury to strawberry crown of *D. decoratus*.

FIGURE 3. View of strawberry field showing healthy three-year-old Wilson plants.

FIGURE 4. View of same field in practically the same rows showing the result of weevil injury on the plants.

out of the ground early in the spring (March) and feed on the leaves of the strawberry. These weevils lay eggs in April and May. The resulting grubs feed on the roots of the strawberry until late summer when they pupate and change to adults (Figure 6).

STRAWBERRY ROOT-WEEVILS CONTROLLED BY POISON BAIT

The strawberry root-weevils can be controlled easily and cheaply by the use of a poison bait. Two types of poison bait have been developed as the result of control experiments conducted by the Oregon Agricultural Experiment Station. These are the poison apple bait and the poison bran bait. Of the various insect poisons that have been tested, calcium arsenate and sodium fluosilicate have given the most consistent results in the control experiments.

Apple bait patented product. The poison apple bait consists of 95 pounds of dried apple peelings (apple waste) and five pounds of the insect poison. The poison apple baits containing from 20 to 25 per cent moisture were more effective in experiments than baits containing a smaller percentage of moisture. The apple bait is a patented product and may be purchased from dealers in spray materials and insecticides. Growers who wish to make their own bait should use bran or shorts as a carrier for the poison.

Bran bait can be home-made. Development of an effective bran bait that could be made by farmers on their farms and yet be effective in weevil control was first accomplished by the Oregon Agricultural Experiment Station. The initial tests with this bait were made in 1926.

The bran bait may be made by the following formula:

Bran	50 pounds
Water	5 gallons
Sugar	10 pounds*
Calcium arsenate or sodium fluosilicate	5 pounds

Of the various sweetening agents used, sugar gave the most uniform results. Some kinds of molasses were satisfactory while others, especially the black molasses, did not give good or uniform results.

Mixing bran bait. The following procedure has proved satisfactory in mixing the bran bait: The sugar is dissolved in water and the solution thoroughly mixed with the bran. As soon as the bran is uniformly moistened, and has absorbed all the solution, the powdered poison is added and thoroughly mixed with the moistened bran.

Many tons of the bran bait have been mixed by county agricultural agents with entire satisfaction, according to all reports received. The method used by the county agents is as follows:

> The powdered poison and the sugar, dissolved in a minimum amount of water, are thoroughly mixed with the bran; then the mixture is sacked and distributed to the growers. It can be held for an indefinite length of time without molding or spoiling. The grower, when ready to apply the bait, spreads the mixed bran thinly on a floor, sprinkles it with the necessary amount of water, using a sprinkling can if available, and then mixes the material thoroughly once or twice with a hoe or shovel to gain even distribution of the moisture.

*Molasses, if desired, can be used in place of sugar at the rate of 2½ gallons in this formula. When molasses is used the amount of water is reduced to 3¾ gallons.

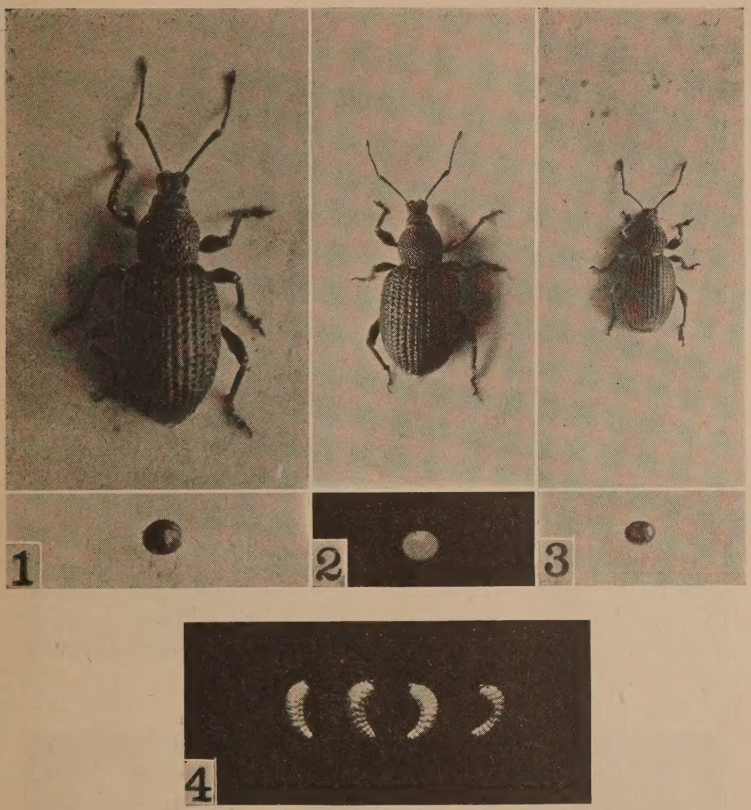

FIGURE 5. Stages in the life history of the common strawberry root-weevils, (*Brachyrhinus* sp.)

1. Adult and egg of the Black Vine Weevil, *B. sulcatus, 3 times.*
2. Adult and egg of the Rough Strawberry Root-Weevil, *3 times.*
3. Adult and egg of the Strawberry Root-Weevil, *B. ovatus, 3 times.*
4. Strawberry Root-Weevil larvae, *natural size.*
5. Larva or grub of Strawberry Root-Weevil, *4 times.*
6. Pupa of Strawberry Root-Weevil, *4 times.*

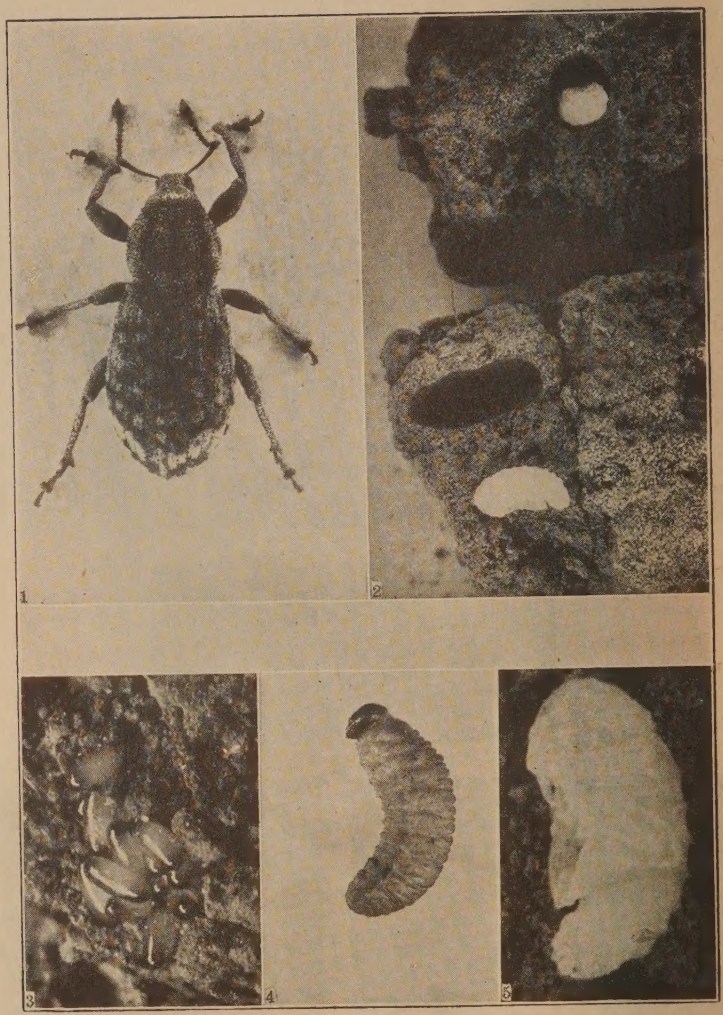

FIGURE 6. Stages in the life history of the native strawberry root-weevils (*Dyslobus* sp.)

1. Adult of *Dyslobus decoratus*.
2. Pupae and pupal cells of *D. decoratus* in soil.
3. Eggs of *D. decoratus*.
4. Larva of *D. decoratus*.
5. Pupa of *D. decoratus*.

Method of application. The bait is applied by placing about one teaspoonful in the center (crown) of each plant. Approximately 100 pounds of the bran or apple bait will treat from one to three acres depending on how close the plants are set. A bait gun (Figure 7) was devised independently by John Ramage of Woodburn and Morris Walton of Parkdale for applying the bait to the crown of the plant.

The bait gun is made of a piece of two-inch galvanized downspout about three feet long, with a six-inch tin funnel soldered into the top. A handle is fastened just beneath the funnel (cover page). This device eliminates the laborious task of applying the bait by stooping to put the material on each plant by hand.

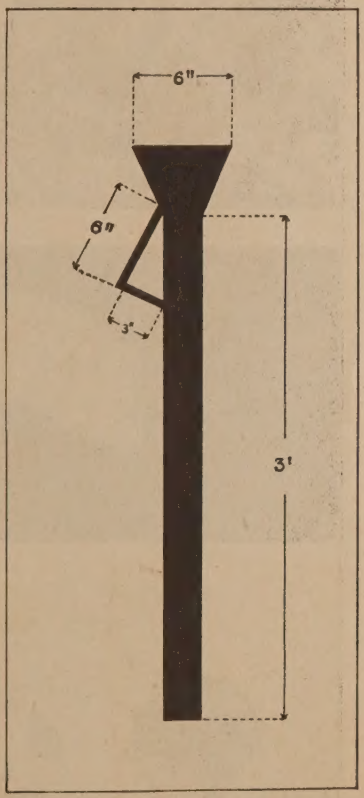

Figure 7. Drawing of "bait gun" giving the more important measurements.

Time of application. The life history of each species of the strawberry root-weevils was studied to determine the most effective date of application of the bait, exceedingly important in combating the pest. In the Willamette Valley only one application of bait is necessary for the control of the common strawberry root-weevil, *Brachyrhinus* group. This is applied when 75 to 90 per cent of the pupae have changed to the adult stage in the soil (1, Figure 8), usually about the time of the second regular picking of strawberries, or at least two weeks before the end of harvest.

As the time of changing to the adult stage varies in different patches, depending on slope, exposure, texture of soil, and probably other factors, the grower should determine the time of application for his own planting by digging specimen plants from time to time and noting what stage the weevils have attained.

Number of applications. In the Hood River Valley and possibly in some of the plantings at higher elevations in the Willamette Valley where overwintering occurs in fairly large numbers, it is advisable to make an additional application for these weevils. This application is made about the middle of May or when the berries are blossoming.

The application of the bait for the control of the native strawberry root-weevils (*Dyslobus* group) is made about April 1 when the adults are found feeding on the plants. The apple bait appears to be better adapted for the

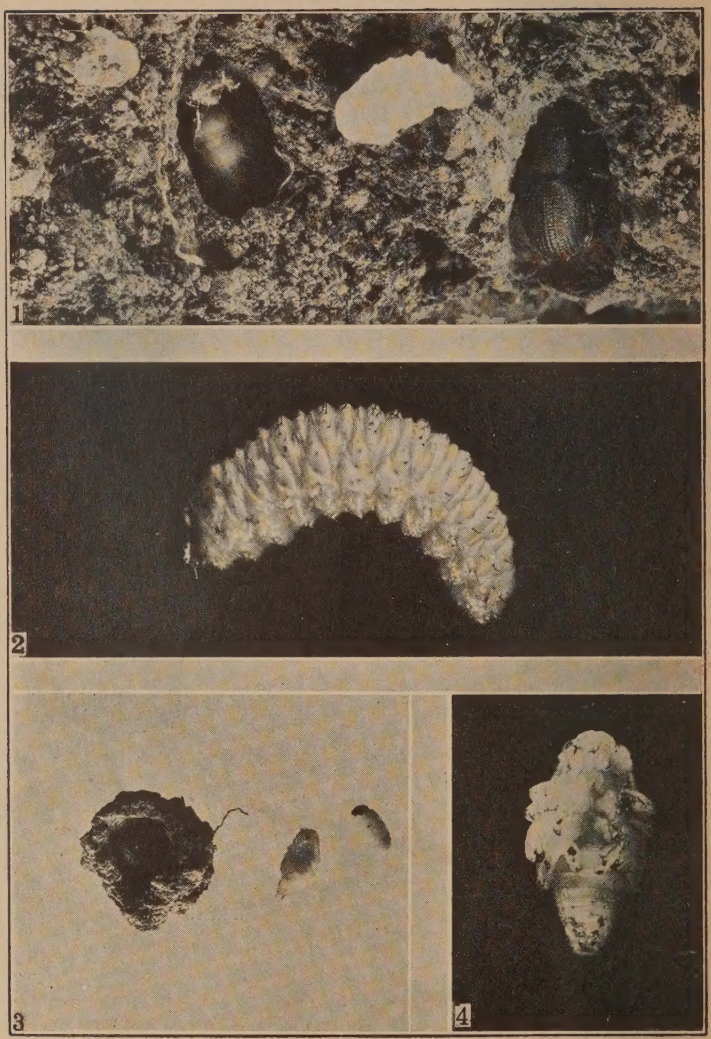

FIGURE 8. Apply the bait when 75 per cent of the pupae have changed to the adult stage in the soil.

1. Pupae, pupal cells, and adults of *B. rugostriatus* in soil.
2. Larva of *B. sulcatus.*
3. Pupa, pupal cell, and larva of *B. ovatus.*
4. Pupa of *B. sulcatus.*

control of the native strawberry root-weevil, although the bran bait, using sodium fluosilicate as a poison, has given very satisfactory control when applied early in April followed by several days of clear weather.

Cost of treatments. One hundred pounds of apple bait will cover from one to three acres of strawberries, depending on the size of the plants, degree of infestation, and space between the plants. Because of the greater bulkiness of bran, the previous formula for the bran bait (containing 50 pounds of bran) will cover approximately the same area as 100 pounds of apple bait. The estimated cost of the bran bait is as follows:

Bran—50 pounds	$0.75
Sugar—10 pounds	.60
Calcium arsenate or sodium fluosilicate—5 pounds	.60
Total cost of materials	$1.95

The price will vary, of course, above or below this amount depending on market conditions and the amount of materials purchased for mixing at one time. But even a top price of $1.95 is reasonable for each application per acre.

ROOT-WEEVIL IS WIDELY DISTRIBUTED

From knowledge of the distribution of this insect in Oregon it can be stated reliably that the root-weevil now occurs practically everywhere that strawberries are grown on a commercial scale. This includes the extensive berry plantings in the Willamette, Hood River, Walla Walla, and Rogue River valleys. Figure 9 shows the distribution in the state at the present time.

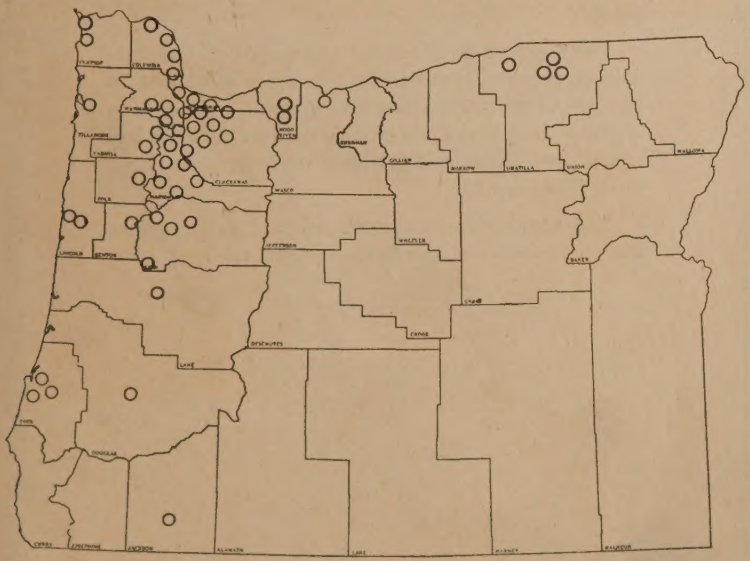

FIGURE 9. Map of Oregon showing areas from which the Strawberry Root-Weevils have been reported.

CONTROL OF THE STRAWBERRY ROOT-WEEVILS

Strawberry Root-Weevils may be controlled by either a poison apple or poison bran bait. (See page 6.)

The apple and bran baits give equally good control of the common strawberry root-weevils.

The bran bait, using sodium fluosilicate as a poison, has given good control of the native strawberry root-weevils only when the application is followed by several days of clear weather.

The bait is applied at the rate of a teaspoonful to a tablespoonful per hill directly in the crown of the plant.

The application of bait for the control of the common strawberry root-weevils is made when about 75 per cent of the weevils have changed to the adult stage in the soil. At higher elevations, such as the Parkdale district, an earlier application is made at blossoming time. (See page 9.)

The application of the bait for the native strawberry root-weevils is made about April 1.